DISTRIBUTION AND HABITS OF THE RABBIT BANDICOOT

by C. H. S. Watts*

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SUMMARY

The known past and present distribution of the rabbit bandicoot (*Macrotis lagotis* Reid), derived from museum records and a ground survey, are plotted. Once extremely widespread, the rabbit bandicoot now occurs only in portions of the Northern Territory, central Western Australia and south-west Queensland. Possible reasons for the reduction in range are briefly discussed and a correlation between the disappearance of the bandicoot and the arrival of rabbits and foxes demonstrated.

Observations on the distribution, density and habits of the rabbit bandicoots living close to Yuendumu N.T. were made over a ten-month period.

The diet in central Australia was investigated by microscopical examination of faeces, and found to be mainly vegetable matter, most of it small seeds and underground bulbs and fungi.

INTRODUCTION

The rabbit bandicoot (*Macrotis lagotis* Reid) was once a common and widespread animal in Australia, but is now restricted to a few areas in central Australia. Many reasons for its decline in range have been suggested but until more detailed information on the nature of the decline and the natural history of the species is forthcoming any explanation is speculative. Successful conservation of the species also depends on an understanding of the reasons behind its disappearance from many areas. In addition a more detailed overall picture of the present distribution and status of the animal is needed in order to judge, with the help of future surveys, whether or not the species is still declining in range.

This study is an attempt to bring together the existing data on the chronology of local extinction of the rabbit bandicoot and to plot its present distribution. At the same time the work on the natural history of the species begun by Smyth and Philpott (1968) has been continued.

METHODS

Information on the localities and dates of collection of the rabbit bandicoot specimens held in museums in Australia, North America and England was obtained to give a picture of the past distribution of the animal. Information on the present distribution came from the same sources, the Northern Territory Administration, and a ground survey carried out in 1968. During this survey I visited as many of the centres of habitation as possible within the area outlined by dashed lines in Fig. 2 and asked the inhabitants if they knew of any rabbit bandicoots in the vicinity. Life-sized photographs were used. If a positive report was obtained an effort was made to confirm it by visiting the locality concerned. It was assumed that only one species of rabbit bandicoot was involved, but it is possible that some of the reported sightings in south-west Queensland refer in fact to *M. minor* (Spencer) a smaller species which may still be present in the area although not collected anywhere since 1930.

* Institute of Medical and Veterinary Science, Adelaide, and Royal Zoological Society of South Australia.

The rabbit bandicoot colonies near Yuendumu, N.T., were more closely investigated. Four visits were made to the area between February and October 1968 and an attempt made, with the assistance of the Aboriginal population, to locate all the nearby colonies. Two colonies were repeatedly visited and burrow use and distribution recorded. Unfortunately all attempts to trap the animals using a large variety of traps proved fruitless.

Fresh faecal pellets (30 or more) were collected from three areas in central Australia and their contents microscopically analysed by a method similar to that used by Watts (1968).

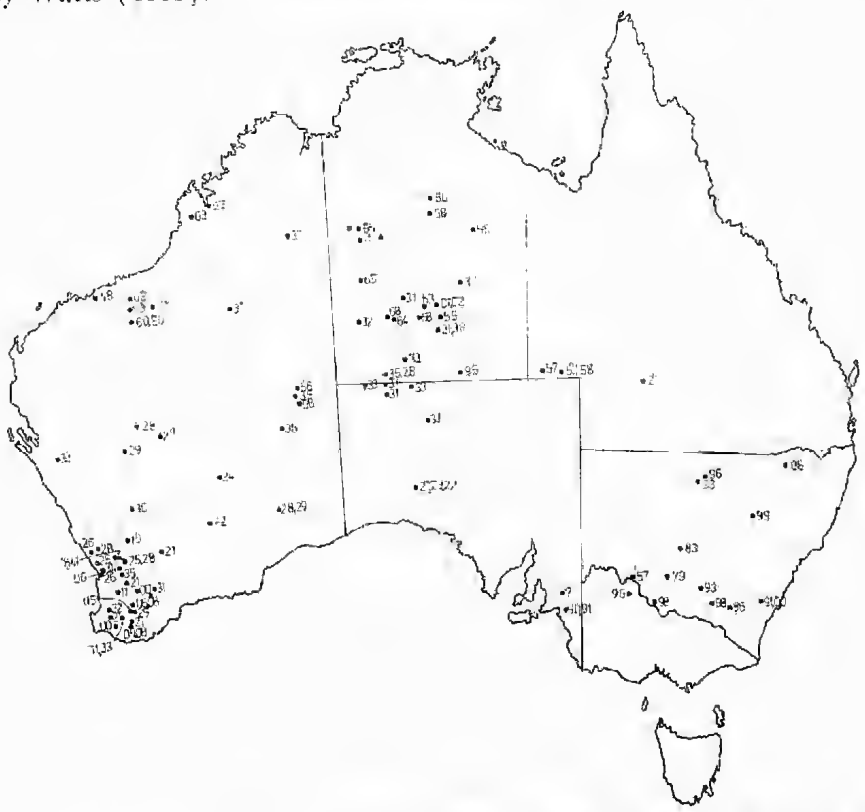

Fig. 1. Former distribution of the rabbit bandicoot based on known specimens. Numbers give collection dates.

RESULTS

Past distribution

The rabbit bandicoot was once extremely widespread, occurring over most of mainland Australia south of 18° south and west of the Great Dividing Range with the apparent exception of central Queensland and most of Victoria (Fig. 1). The species appears to have disappeared from New South Wales and southern South Australia rather suddenly around 1900 and from south-west Australia and northern South Australia in the 1930's.

This picture of sudden extermination over wide areas may to some extent represent the vagaries of collection, but seems to be marked enough to be real. An example of false record is the comparative lack of records from southern South Australia where, according to Wood-Jones (1924), the species was common around 1890.

Present distribution

At the present time the main concentration of rabbit bandicoots is in the Northern Territory to the west of the Stuart Highway, between 18° south and 24° south (Fig. 2). Outlying populations remain in south-west Queensland, the Warburton Ranges, W.A., and on the central coast of Western Australia. Whether or not the Western Australian populations are isolated from one another or from the Northern Territory population is uncertain due to the absence of recent collecting in the intervening Great Sandy Desert. The south-western Queensland population is almost certainly an isolated one.

Habitat

Rabbit bandicoots are today found over a wide range of desert and sub-desert habitats wherever the ground is soft enough to burrow in and is not subject to waterlogging. There is a tendency for burrows to be located in the more open areas and along water-courses. Illustrations of the type of habitat colonised are given by Smyth and Philpott (1968).

Food

Table I. The bulb of *Cyperus bulbosus* made up most of the diet at Papunya and was prominent in the diet at Yuendumu. In both places the animals were living close to water-courses where the plant was moderately common. On an open, wire-grass plain at Hamilton Downs, the underground fruiting bodies of the fungus *Endogone* made up much of the diet. Much of the diet at Yuendumu was composed of a small, crinkled seed not specifically identified, but resembling those of the small succulents *Calandrinia* or *Trianthema*.

Field observation at Yuendumu showed that rabbit bandicoots were eating the centres of the tap roots of *Solanum* spp. and *Boerhavia diffusa*. The unidentified fibres found in the faeces could have been from these.

Insect matter was sparse in most samples. Identifiable portions were mostly from adult Coleoptera.

Large quantities of sand occurred in all the faeces.

Social structure and habits

In the Northern Territory rabbit bandicoot colonies consist of from 7 to 28 (av. = 17, n = 6) separate burrows spread over a large and usually elongate area. Three colonies at Yuendumu covered 28, 38 and 40 acres respectively. The

TABLE 1

Food types present in rabbit bandicoot faeces from three different areas of Central Australia. Figures give percentage volume

	Locality				
	Yuendumu			Hamilton Downs	Papunya
Date	2–68	4–68	7–68	7–68	4–68
Insect	2	11	6	3	2
Fungus (*Endogone*)	2	T	5	69	5
Bulb (*Cyperus*)	8	32	20	0	90
Seed (*Solanum*)	2	0	23	0	0
(? *Trianthema* or *Calandrinia*)	76	45	20	7	3
(Compositae)	0	0	0	T	0
(Other)	5	4	9	2	0
Fibre	5	8	17	20	0

T = Trace

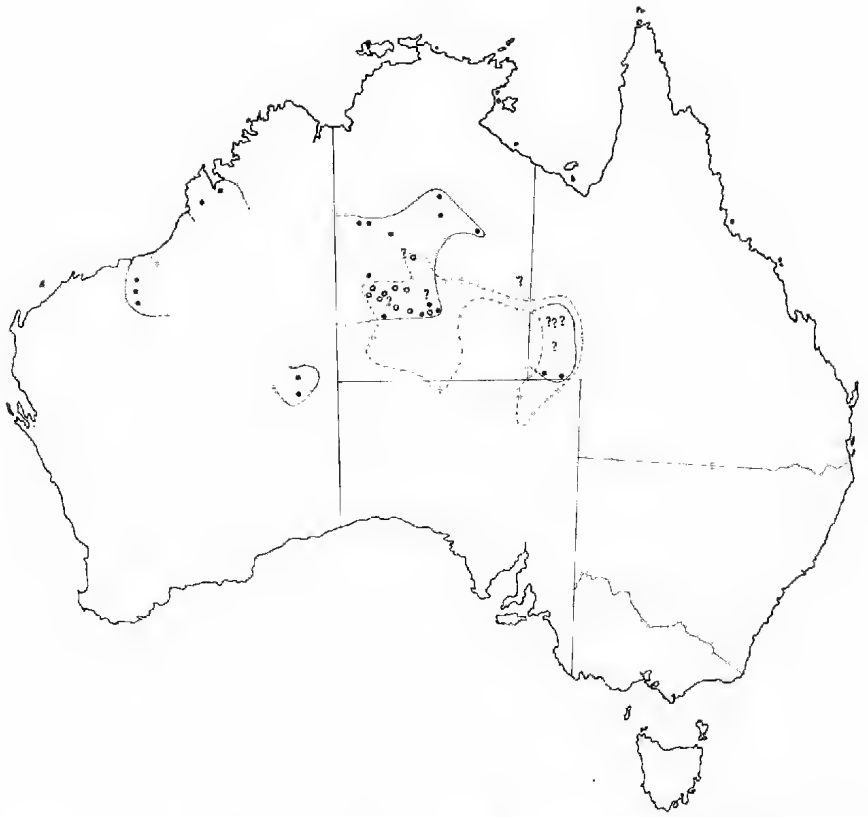

Fig. 2. Present distribution of the rabbit bandicoot. • = locality of specimen collected in past 15 years; ○ = known locality but without specimen; ? = unsubstantiated report; - - - = area surveyed.

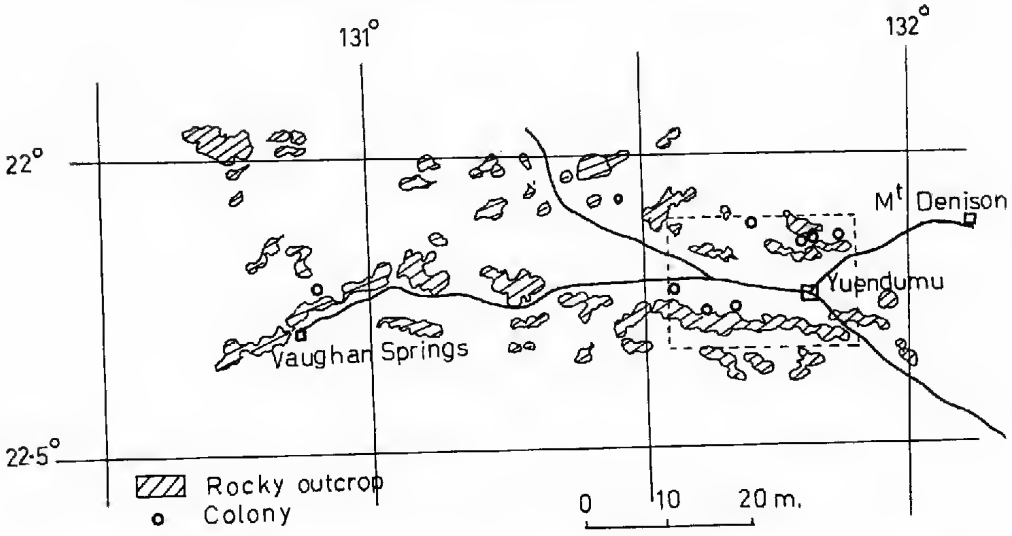

Fig. 3. Distribution of rabbit bandicoot colonies close to Yuendumu, N.T.

distribution of the burrows in a large (58 hole) colony in the Warburton Ranges has been described by Smyth and Philpott (1968) and my observations in the Northern Territory confirm their general description.

There are two basic types of burrow. The commonest is an isolated burrow about 6 in. in diameter which descends in a spiral to an average depth of 2·4 feet (1·5 to 4·0 feet, n. = 13). At Yuendumu 70% of these were under or close to a bush or fallen log. Usually there is only one complete turn and in 9 out of 13 burrows the spiral was clockwise. There is no special chamber at the end of the burrows, but the burrow usually flattens out at the end. In 2 of the 13 burrows excavated at Yuendumu a small side tunnel, most probably a bolt hole, led off the main tunnel and ended close to the surface. The second type of burrow is more complex and consists of several entrances and a series of interconnecting tunnels spread over an area of up to 100 square feet. Usually there was only one such burrow in any burrow group and it was absent from several groups. All such burrows appeared to be of long standing and probably resulted from long occupation of a favoured site. A few burrows excavated were intermediate between the two types.

From detailed observations of burrow use in one area at Yuendumu over a period of two weeks and from repeated visits to known colonies close to Yuendumu some idea of the pattern of burrow use emerged. When there is a complex burrow this is used most nights and appears to be the main sleeping quarters. The remaining burrows in the area are visited less frequently and only occasionally are used as sleeping quarters. Usually only the main burrow and one or two of the nearer single burrows are used on any one night, but on some nights, particularly rainy ones, virtually all the burrows are visited and cleaned out. When there is no large burrow in the area, a few well used burrows, often widely separated, appear to be used as sleeping quarters.

From the evidence of tracks, faeces and scratchings, rabbit bandicoots seldom move more than 100 yards from a burrow. In two instances the tracks of a large bandicoot leading away from a colony were tracked for 0·8 and 1·2 miles respectively. It is possible therefore that some inter-colony visiting takes place.

The number of individuals living in a group of burrows appears to be far fewer than first impressions would indicate. At Papunya a group of six burrows were dug up yielding one adult female. At Yuendumu a group of twelve burrows yielded an adult female and there was evidence of another individual in the vicinity, a group of twenty-eight burrows yielded an adult male, an adult female and a juvenile, and another group of burrows under detailed observation never gave evidence of being occupied by more than two individuals. Aboriginal testimony was that an adult male and female with one or occasionally two young usually occupied a group of burrows. Kreft (in Troughton, 1967) reported that in N.S.W. rabbit bandicoots lived in pairs. Thus it appears that each group of burrows is occupied by a pair and any offspring of the year.

In a three hundred square mile area close to Yuendumu I eventually located seven burrow groups (Fig. 3). Approximately a third of this area was rocky and unsuitable for bandicoots. The colony density in suitable habitat was thus roughly one per thirty square miles. Assuming an average colony size of three individuals, this works out at one rabbit bandicoot per ten square miles of suitable habitat.

DISCUSSION

The dentition of the rabbit bandicoot suggests a predominantly carnivorous diet. Field observations of fur in the stomachs of the related *M. minor* (Findlayson, 1936) and the ease with which captives dispatch mice seem to confirm this. However, Smyth and Philpott (1968) showed that in the Warburton Ranges the animal

was mainly insectivorous the bulk of the diet being termites and my observations indicate that, in Central Australia, the rabbit bandicoot is omnivorous and that at times its diet is almost totally vegetable. These results bear out Kreft's previously discredited observation that the diet in N.S.W. included bulbous roots (quoted in Troughton, 1967).

Most of the "bush tomato" (*Solanum* spp.) seeds eaten at Yuendumu were intact, suggesting that the flesh and juice of the fruit was the main attraction. About half of the seeds tentatively identified as coming from small succulents were undigested and it is possible that in this case also it was the flesh and juice of the fruit that were being sought. However, in these species the fruits are small and the least succulent part of the plant and there was no evidence of their remains in the faeces. The large quantity of these small seeds in the faeces is something of a puzzle.

Comparison of the known past and present distributions illustrates strongly the great shrinkage of range that has taken place since early settlement. Whether this shrinkage is still occurring must be left for future surveys to answer.

The reasons for the decline in range and probably also in density are difficult to identify. The decline has been from the south which implicates European man or his introductions. The fact that the animals did not disappear from New South Wales until around 1900 and were common in the settled areas close to Adelaide in the 1890's (Wood-Jones, 1924) and in the south-west until as late as 1930 suggests that European man and close settlement with the resultant alteration of habitat were not the prime causes of the rabbit bandicoot's extinction in these areas. In addition the animal has disappeared from the large reserves in north-west South Australia where there has as yet been little alteration of the habitat by man.

European man introduced the fox, rabbit and cat into Australia and all are now widespread. The cat was the earliest introduction and spread rapidly, even preceding European man into the central regions (Findlayson, 1961). Since the bandicoot and feral cat co-existed for many years the cat presumably has had little to do with the comparatively recent extermination of the bandicoot.

Rabbit bandicoots appear to have disappeared rather suddenly from New South Wales and southern South Australia around 1900, from Western Australia and northern South Australia in the 1930's, but are still present in central Australia. These dates correspond with the arrival of the fox in these areas and correlate quite well with the arrival of the rabbit which became established in southern South Australia and New South Wales around 1890 and south-west Australia and northern South Australia around 1910. Both rabbits and foxes are rare in the areas where rabbit bandicoots still exist. Thus, on this broad evidence, either or both competition for burrows by rabbits and predation by foxes could have led to the sudden demise of the rabbit bandicoot. It is probable that although the rabbit together with the cat and man's hunting, farming and ranching undoubtedly contributed greatly to the reduction in numbers and range, the coup de grace in most areas was probably delivered by the fox.

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